

Ohio. Dept. of Health. Report of investigation of sanitary condition of Old Soldiers' and Sailors' Orphans' Home.

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REPORT OF AN INVESTIGATION
OF THE
SANITARY CONDITION

OF THE
Ohio Soldiers' and Sailors' Orphans' Home,
AT XENIA, OHIO.

BY A COMMITTEE OF THE STATE BOARD OF HEALTH,
February 14, 1890.

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Report of an Investigation
OF THE
SANITARY CONDITION
OF THE
OHIO SOLDIERS' AND SAILORS' ORPHANS' HOME,
XENIA, OHIO.

To the Honorable, the 69th General Assembly of Ohio:

In compliance with House Joint Resolution No. 21, a Committee of the State Board of Health was appointed by the President, and proceeded at once to investigate the sanitary condition of the Ohio Soldiers' and Sailors' Orphans' Home, at Xenia, Ohio.

The Committee respectfully submits the following report:

The epidemic which led to the investigation began September 28, 1889—two boys from Cottage No. 18, having developed diphtheria on that day, and both dying within a week.

The origin of these cases could not be positively determined. Diphtheria was present in Xenia, at that time, and also in a house near the Home.

From September 28, 1889, to February 10, 1890, 142 cases of diphtheria occurred, and twenty-four children and one hospital nurse died from the disease or its complications.

About two weeks after the appearance of diphtheria, scarlet-fever developed among the children, the first case being a child received at the Home a short time before it was taken ill. Fortunately this disease was exceedingly mild, there having been 240 cases with but a single death. Scarlet-fever has now entirely disappeared. The diphtheria epidemic has greatly abated, though it still prevails to some extent, there having been three deaths from the disease within the past ten days.

For a proper understanding of the sanitary conditions existing there, it will be necessary to give a brief description of the Home and its surroundings.

The Home consists of a farm of 293 acres, situated one mile southeast of Xenia, on which are located some forty buildings, consisting of an administration building, with childrens' general dining room attached, twenty old single cottages and four new double cottages, occupied by the children, two school houses, a chapel, industrial building, hospital, laundry and out buildings.

The administration building and the old cottages are placed in a line running east and west, presenting a frontage of about fifteen hundred feet. East of this line are the four new double cottages.

The cottages are two stories, and all of the buildings are of brick, placed on an elevation favorable for natural drainage. The soil is a clayey loam, underlaid with a gravelly sub-soil and the ground water level, when measured, was eleven feet, three inches below the surface.

There are usually about nine hundred children at the Home, and one hundred and fifty employes.

HEATING AND VENTILATION.

The buildings are all heated with steam by direct radiation, a steam heater being placed in each room. The living room of each cottage is also furnished with a stove, to be used in severe weather.

The buildings are generally greatly overheated. On February 5, a moderately warm day, the temperature in the cottages was found ranging from 80° to 90° Fahr., and this was with several windows wide open.

A vital omission in this system of heating, as found at the Home, is the absence of any means of regulating the amount of heat sent to each room, it being impossible to shut off the steam, when the rooms become too warm, and as a consequence the children live almost constantly in an overheated atmosphere, and are extremely sensitive to outdoor exposure. Catarrhal conditions of the throat and nasal passages are generally prevalent, and a number of children showed enlargement of the tonsils and congestion of the mucous membrane, conditions undoubtedly predisposing to diphtheria.

The heating of the hospital is especially defective. On November 20, a moderately cool day, the temperature in one ward, crowded with sick children, was 100° Fahr., while in a ward on the opposite side of the building, it was 55° Fahr. There is no way of admitting fresh air to the hospital wards, except by the windows, which are so located that the children are unavoidably exposed to dangerous draughts.

VENTILATION.

With but a few exceptions, there is practically no ventilation in any of the buildings. In the old cottages there are a few very small ventilators, but tests showed in most instances that no air was passing out of these openings, and in some cases, back currents were found.

The air was examined in the dormitories of Cottages Nos. 2, 3, 5, 21 and 24, between the hours of 6 and 7 A. M., the rooms having been vacated from a half to three-fourths of an hour before. Bad odors were found in all, and especially in Cottage No. 24, which is one of the new cottages. Tests were made for carbonic acid, and from three to four times the amount allowable in respirable air was found. It is to be borne in mind that the carbonic acid found in occupied rooms is a measure of the organic impurities present in the atmosphere, coming from the lungs and bodies of their occupants.

The dormitories of the old cottages are 33 feet 8 inches long, 17 feet 6 inches wide, and 8 feet 9 inches high, giving an air space of 5,154 cubic feet. This space is diminished by closets and furniture at least one-tenth, leaving an actual available air space of about 4,641 cubic feet.

Each cottage contains sixteen beds, and usually thirty-two children ; and in times past as many as thirty-seven children have been crowded into them. With the present number, thirty-two, each child has a breathing space of 145 cubic feet. This virtually means that each child is confined over night in a box 6 feet long, 6 feet wide, and 4 feet high, and this box practically without ventilation.

The new cottages are somewhat larger, but are also entirely too small, as the dormitories contain an air space of but 212 cubic feet per capita.

SEWERAGE.

The sewerage system, in many respects, is to be commended. In the rear of the boiler-house is a tightly closed cess-pool of a thousand barrels capacity, into which the main sewers deliver the sewage from the entire plant. Leading from this cess-pool to the boiler-house is a 10-inch pipe, which effectually ventilates not only the cess-pool, but the entire sewerage system.

We had the main sewer opened at four different points, and found a powerful draught toward the cess-pool at each opening.

From the cess-pool the sewage is pumped daily to several fields, about a half-mile distant, where it is received in a number of reservoirs, from which it is allowed to flow over the land. Formerly, the sewage was discharged into a cess-pool, some distance northwest of the buildings, with an overflow into a creek, which runs through the town of Xenia.

This old line of sewer still exists, and sewage is sometimes discharged in this direction. Sewage from the old school house is also discharged into this old cess-pool, which was found in a very foul condition.

PLUMBING.

The plumbing throughout, with but few exceptions, should be condemned.

The water closets are of antiquated pattern, long since discarded in sanitary plumbing, inefficiently trapped, and scarcely at all flushed after using. The iron soil-pipe in each cottage ends just beneath the first floor, where it enters an 8-inch drain tile, the connection being made with a cement joint. This drain runs through the foundation wall at the rear of each cottage, where it joins the main sewer.

A break in this drain, which might easily occur from the settling of the foundation walls, or other cause, would saturate the ground under the cottages with filth.

The floors of the bath-rooms and water-closets in nearly all old cottages, were in bad repair, large cracks existing in the flooring, which would readily admit water and filth, when the rooms were being scrubbed. In Cottages Nos. 1 and 4 the floors were torn up, and a large amount of filth was found under them. This adds considerably to the air pollution in the cottages.

WATER SUPPLY.

The water supply is derived principally from two sources, viz.: A large well and a small creek running through the grounds. The well is a trench 60 feet long, 5 feet wide and 24 feet deep, dug in quick-sand at the bottom of a hill, the water being pumped to a tower 800 feet distant, where it is stored in iron tanks.

This well furnishes a very limited supply of water; there is never more than three feet of water in it, and even in wet weather it may be pumped completely dry in 35 minutes. In the summer it is often dry for weeks at a time, and during August and September of last year it completely failed, during which time the only water furnished to the Home for drinking and all other purposes had to be taken from the creek.

A reservoir, formed by excavation, is situated between the well and the creek—about 20 feet from the former and 30 feet from the latter. It is of an irregular shape, about 150 feet long, 100 feet wide, and 4 feet deep at its greatest depth. This reservoir is filled from the creek through the channel controlled by a gate.

The well furnishes water for drinking and culinary purposes, and for water closets, baths, etc., in most of the buildings.

The reservoir supplies the new cottages (except for drinking purposes), the laundry and several other buildings.

Separate lines of pipe run from the well and reservoirs to the water tower, but by simply changing a valve at the pump house, water from the reservoir can be sent through the pipes, leading from the well, thus supplying drinking water from the reservoir. Two hundred yards above the reservoir, on the edge of the creek, and outside of the Home grounds, is a slaughter-house; all offal and wastes from the slaughter-house are washed into the creek, while cattle and hogs have free access to it.

The slaughter-house yard was extremely filthy, old bones, manure, hair, etc., being in close proximity to the water's edge, while a number of hogs, confined in an extremely offensive pen adjoining the slaughter-house, were seen feeding on the offal of slaughtered animals.

This creek becomes almost dry in hot weather, and it is sometimes difficult to secure water sufficient to fill the reservoir. Ice is harvested from the reservoir whenever possible, and is used for all purposes.

Samples of water were taken from the following sources and submitted to Prof. C. C. Howard, of Columbus, Ohio, for analysis:

Sample No. 1, reservoir water taken at the laundry.

Sample No. 2, well water taken from the tank.

Sample No. 3, well water (pump well) in rear of hospital.

Sample No. 4, well water (pump well) near industrial building.

His report is as follows:—

DR. C. O. PROBST, *Secretary*:

DEAR SIR: The four samples of water received by express from Xenia have been examined by me with the following results:

No.	Oxygen required.	Free ammonia.	Alb. Ammonia.	Nitrous acid.	Chlo.
1	.10	.012	.015	trace	1.28
2	.08	.012	.010	trace	.85
3	.13	.006	.012	.001	3.20
4	.09	.005	.008	trace	1.85

(Parts to 100,000.)

An examination of these numbers shows that none of the waters are of excellent quality. Nos. 1 and 2 are so impure that they ought not to be used; and 3 and 4, though less objectionable, are of doubtful quality.

Yours respectfully,

(Signed)

C. C. HOWARD, *M. Sc.*

HOSPITAL.

The hospital is a two-story structure built in the shape of a cross, with a front and rear entrance connected by a hall running through the center of the building. It contains seven wards, a dining-room, kitchen, two matrons' rooms, an office and a reception room. It is impossible to

enter the wards at the extremities of the building without passing through intermediate wards, and with two contagious diseases prevailing at the same time, as recently happened, it is utterly impossible to secure the necessary separation. As a result, many patients will almost inevitably contract both diseases. The ventilation of the Hospital is fully as bad as in the cottages, while the heating is infinitely worse.

In a Home of 900 children, subjected to outbreaks of contagious diseases, some provision should be made for the isolation of suspected cases. With the present hospital arrangements, it would not be safe to send a suspected case of diphtheria, scarlet-fever, or small-pox to the hospital, if it contained children affected with other diseases.

A quarantine hospital, to which children with suspicious sore throats could have been immediately sent to await developments, would have been of inestimable value during this epidemic.

Finding several children in the cottages, possibly in the incipient stage of diphtheria, we issued the following order, No. 1:

RULES FOR THE PREVENTION OF THE SPREAD OF DIPHTHERIA AT
THE O. S. AND S. O. HOME.

XENIA, OHIO, *February 10, 1890.*

RULE 1. There shall be fitted up at once detention wards for receiving all suspected cases of diphtheria, where such cases shall be immediately sent and kept under observation not less than fourteen days.

Suspected cases shall be received in Ward No. 1, and shall remain there for the period of three days, when, if there are no distinctive evidences of diphtheria presenting, they shall be removed to Ward No. 2, to remain until the expiration of the detention period. Then, after thorough cleansing and disinfection, they may be returned to their respective cottages, upon the approval of the physician.

RULE 2. Convalescent patients from the hospital, after being thoroughly bathed, disinfected and dressed in clean clothing, which has not been kept in the hospital, shall be sent to the convalescent wards and kept there for a period of ten days. At the expiration of this time they shall be thoroughly bathed and disinfected, dressed in clean clothing, and may then be returned to their cottages, upon approval of the physician.

RULE 3. The matrons shall inspect the throats of the children in their respective cottages twice daily; in the morning before breakfast, and in the evening before supper, and notice shall be immediately sent to the office of the superintendent of all cases of sore throat or other sickness found. Such inspection shall be made by using a spoon to depress the tongue, the spoon to be disinfected after the inspection of each child, by washing in a solution of bichloride of mercury, 1 to 1000, and wiping on a clean cloth, which shall be burned.

RULE 4. All disinfectants kept for use in the cottages or elsewhere shall be marked *poison*, and kept in a place secure from access by the children.

RULE 5. These rules shall be printed and copies posted in all the occupied buildings on the grounds.

By order of Ohio State Board of Health.

(Signed) THOS. C. HOOVER,
E. T. NELSON,
C. O. PROBST,
Committee.

Approved: NOAH THOMAS, *Superintendent.*
C. M. GALLOWAY, *Physician.*

The children in cottages Nos. 1 and 4 suffered a greater mortality from diphtheria than those of any other cottage, there having been five deaths in the former and six in the latter. Cottage No. 1 had been vacated for many weeks, but the children belonging to cottage No. 4 had been taken out and returned on three different occasions, and each time they were returned the disease broke out among them. Especial attention was given by the committee to these cottages. The sewers and drains were dug up, the floors in water-closets and bath-rooms torn up, and the plumbing tested. Nothing was found to account for the excessive mortality in cottage No. 4. No. 1 occupies low ground, the rear end resting directly on the ground. As a consequence the walls are frequently very damp, and we were informed that at times the water could be seen standing in drops on the walls.

The following order, No. 2, was issued :

February 11, 1890.

Major Noah Thomas, Superintendent O. S. and S. O. Home, Xenia, Ohio :

SIR: In view of the fatalities from diphtheria in cottages Nos. 1 and 4, and of the repeated outbreaks in the same, we ask that the following precautions be taken before they are again occupied :

1. That all clothing, bedding and all other textile fabrics, and all pictures, books, toys, and other articles, except chairs, tables, stands, stoves and bedsteads, be taken from said cottages and burned.

2. That all the floors be taken up and new ones laid, with leaded joints, and afterwards oiled with not less than two coats of oil.

3. That water-closets be torn out and replaced with approved modern closets, with a separate trap for each fixture.

4. That all ceilings, side walls, windows, woodwork, and all chairs, tables, stands and bedsteads be washed with a solution of bichloride of mercury, of the strength of one to one thousand.

5. That each cottage be fumigated by burning not less than fifty pounds of sulphur, distributed proportionately to the sizes of the rooms, all openings having been previously closed.

6. That ceilings be lime washed, walls and woodwork painted, and chairs, bedsteads, tables and washstands varnished.

7. That cottage No. 1 be excavated under the rear part and drain tile laid near foundation walls to render them dry.

After these instructions have been complied with the cottages may be occupied by their respective families.

(Signed) THOS. C. HOOVER,
E. T. NELSON,
C. O. PROBST,
Committee.

We have endeavored in the foregoing pages to present to you the actual sanitary conditions found at the Home, and would sum up our conclusions as follows :

The overcrowded condition of the dormitories and the total lack of ventilation, together with a greatly overheated atmosphere on many occasions, make these cottages veritable hot-beds for propagating the germs of infectious diseases. A child with diphtheria sleeping with its companions under such conditions might readily infect the entire family. It frequently happened when the recent epidemic first broke out that from lack of hospital accommodations, infected children were associated with their companions from 24 to 48 hours before removal.

It is a well known fact that persons compelled to breath an atmosphere polluted with the organic impurities of respired air, are rendered exceeding prone to all infectious diseases, and are also more liable to succumb when so affected. So long as these children of the Home are subjected to the dangers of overcrowding, and are given such grossly impure water as is sometimes supplied, we may expect epidemic diseases to prevail among them. What can be said of supplying these children with water from a creek reeking with the filth of a slaughter-house, not 200 yards from the in-take! The constant cry last summer, we were informed was "water, water, water." None was to be had except from the reservoir, which was covered with a filthy scum, and this supply was so limited that men followed up the creek, opening out all the little stagnant pools, in their efforts to supply the demand. Is it a wonder that sickness has resulted? Looking at the twenty-four little new graves at the cemetery, the question arises, who is responsible?

While it is true that it is probably impossible to entirely prevent the introduction of infectious diseases in such a Home, it is also true that such diseases are preventable; and if the children had been living under healthful conditions, and proper isolation could have been given, the present epidemic could have been promptly stamped out.

The hospital is entirely unsuited for epidemic emergencies. In the beginning of this epidemic the wards were rapidly filled with sick and dying children, and those already in the hospital for other diseases were exposed to all the dangers of intimate association with diphtheria, and scarlet-fever patients.

On visiting the hospital on the night of November 20th, it was found to be excessively overcrowded. In one ward, filled with sick beds, the atmosphere was stifling—the temperature 100° F., and yet, on account of the arrangement of the windows, it was impossible to admit a breath of fresh air, without exposing the patients to dangerous draughts. Physicians and nurses could not avoid free mingling with both the scarlet-fever and diphtheria patients, and a proper separation of these diseases was impossible. The children at that time had become almost panic stricken, and an order to be sent to the hospital produced almost the effect of a death warrant.

Owing to the abominable construction of the hospital, the bodies of those who died had to be carried out through wards occupied by sick children, and at least one death occurred in a convalescent from the shock produced by such a sight.

The hospital at this time became a veritable death-trap; the superintendent refused to allow another child to be taken into it; and it became necessary to vacate some of the cottages and utilize them and the school-house and industrial building as convalescent and quarantine wards.

We would urgently recommend to your honorable body that the following additions and changes be made:

1. The overcrowded condition of the cottages should be relieved as soon as possible for reasons already given.
2. Changes should be made in all the heaters so that the amount of heat sent to each room can be regulated.
3. Provision should be made for the constant and thorough ventilation of each cottage.
4. The old line of sewer used mostly for an overflow of rain water, and the cess-pool into which it discharges, should be abandoned and dug out. The rain water, now lost by discharging through this sewer, could be stored and utilized.

Most of the plumbing in both old and new cottages should be torn out and replaced with that of approved modern pattern. The soil pipe should be carried full size through the roof, and the tile house drain replaced by iron pipe carried beyond the foundation walls. The floors in the water closets and bath rooms in the old cottages should be torn out and replaced with new water tight floors.

6. An additional supply of drinking water should be secured, and it should be made impossible to fill the drinking water tanks with water from the reservoir. The pump wells on the grounds should be filled up. Ice should not be collected from the reservoir for any purpose.

7. A new hospital for general diseases should be built at once. It should have not less than 150 beds, and should be constructed on modern approved plans.

The present hospital should be remodeled by dividing the larger wards and providing a separate entrance to each, and used as a quarantine hospital. The heating of each ward should be arranged so as to be properly regulated, and provision for increasing the ventilation of each ward should be made.

Our committee is under many obligations to the officers and employes of the institution, all having joined in affording us information and assistance in our investigation.

Respectfully submitted.

(Signed)

THOS. C. HOOVER,
E. T. NELSON,
C. O. PROBST,

Committee.

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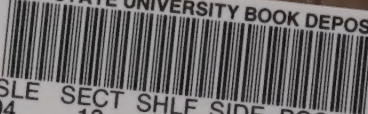
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